

# Artificial Intelligence

## Lecture-1

- **Introduction to AI**
  - ▶ Foundations of Artificial Intelligence

- *Prepared by:*

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# Outlines

## Today's class:

- **Introduction to AI**
- **How to work human brain?**
- **AI Terms**
- **AI: Definition**
- **AI Systems: Definition**
- **Objectives of AI**
- **Goals of Artificial Intelligence**
- ...

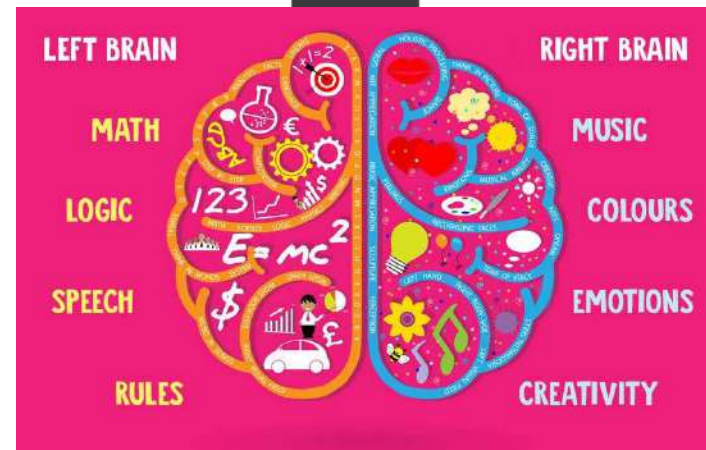
# Introduction to AI

- Early computers dealt with numerical computations. Current computers are involved in reasoning with knowledge in addition to numerical computations.
- With AI the role of computers changes from something useful to something essential.
- The aim of AI is in some way to try to make computers performs tasks that human tend to be good.
- AI fills the gap between the scientists of human behaviour and the computer scientists. Human scientists can test their theories about human behaviour by converting their rules to computer programs. Computer scientists can look at modelling human behaviour as a challenge to their programming abilities: if a person can do something, can we write a computer program which does the same thing?
- The actual name ‘Artificial Intelligence’ was coined by John McCarthy in the 60s – he was the designer of the language LISP.

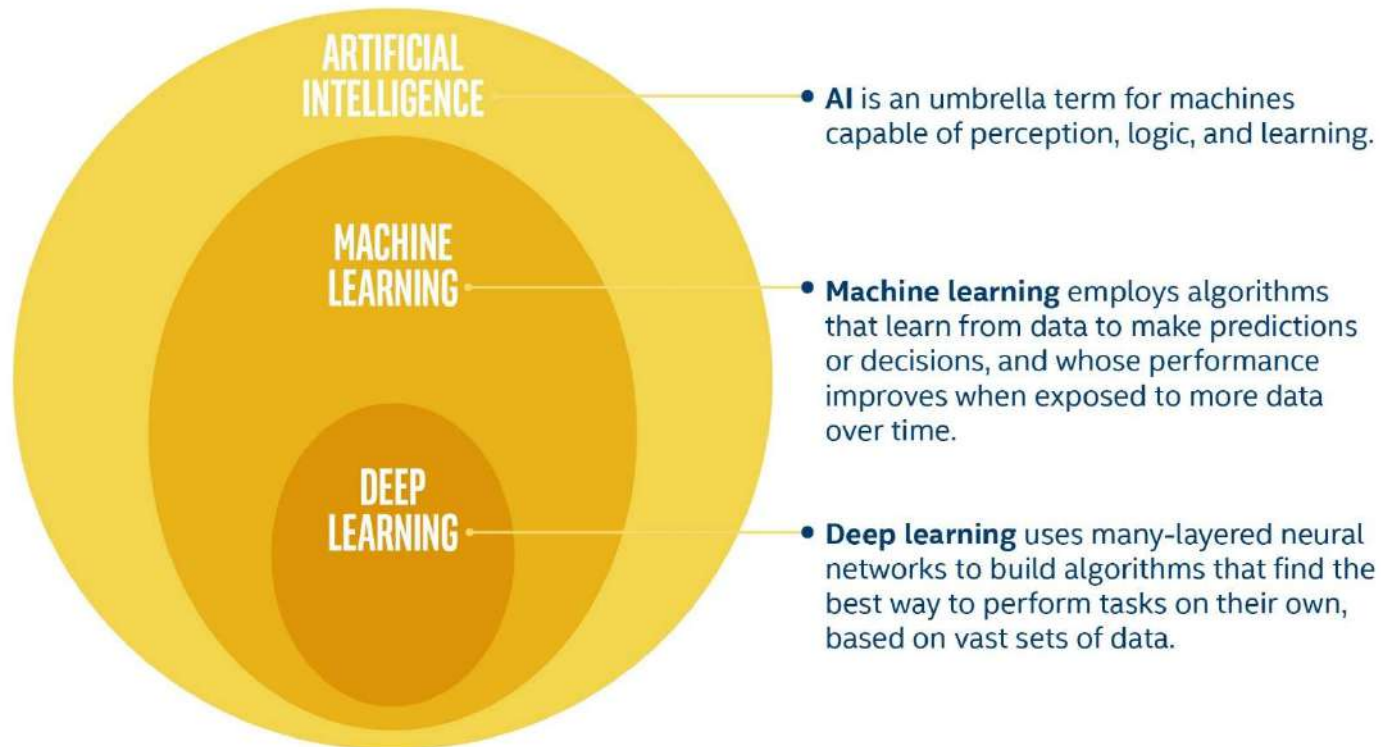
# How to work human brain?

- The brain works like a big computer.
- It processes information that it receives from the senses and body, and sends messages back to the body.
  - The human brain is the command center for the human nervous system. It receives signals from the body's sensory organs and outputs information to the muscles.
- But the brain can do much more than a machine can: humans think and experience emotions with their brain, and it is the root of human intelligence.

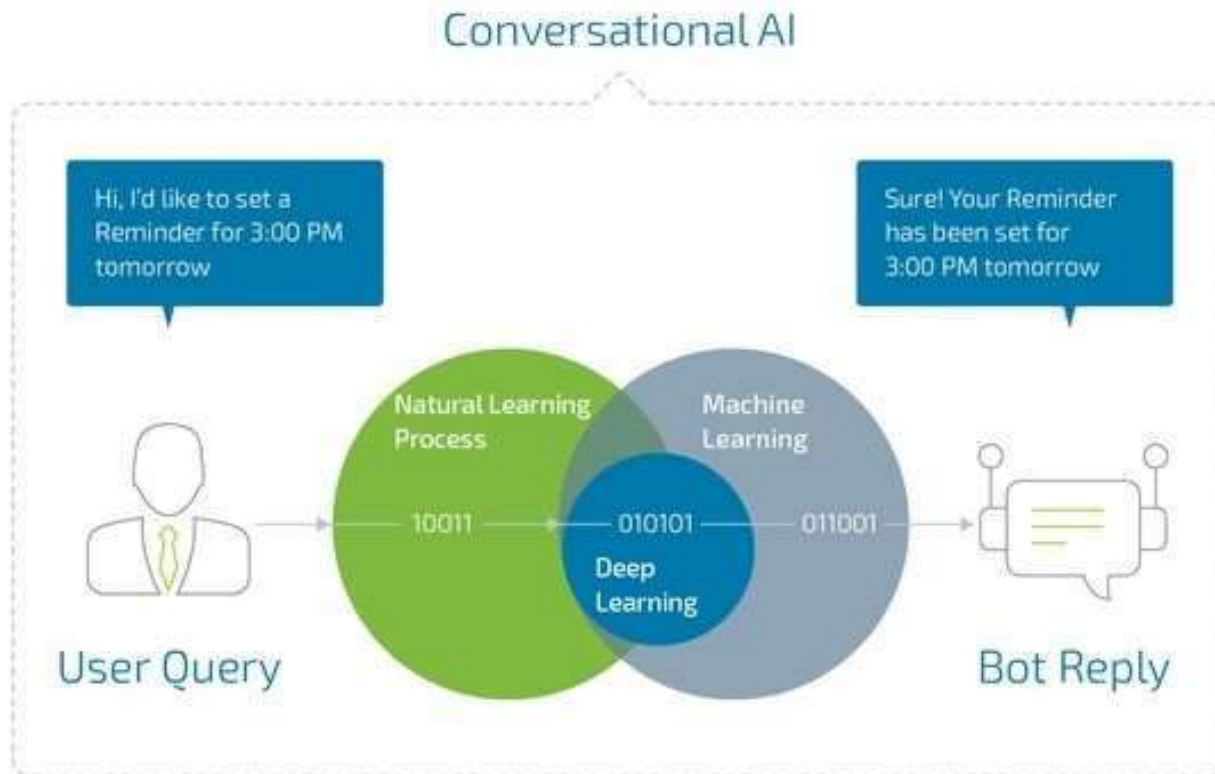
The human brain is unique. Although it's not the largest (1.5kg), it gives us the power to speak, imagine and problem solve. It is truly an amazing organ.



# AI Terms



# AI Terms



# AI: Definition

- We can define AI in many ways:
  - Artificial Intelligence (AI) is the study of how to make computers do things at which, people are better at the moment.
  - AI is the branch of computer science dealing with symbolic, non-algorithmic methods of problem solving.
  - AI is a part of computer science concern with designing intelligent computer systems that exhibit the characteristics used to associate with intelligence in human behaviour.
  - AI is the synthesis and analysis of computational agents that act intelligently.

# AI Systems: Definition

- **A good general definition of AI could be:**
- *AI is a branch of computer science concerned with the study and creation of computer system that exhibit some form of intelligence:*
  - ▶ *Systems that learn new concepts tasks;*
  - ▶ *System that can reason and draw useful conclusion about the around us;*
  - ▶ *Systems that can understand a natural languages or perceive and comprehend a visual scene; and*
  - ▶ *Systems that perform other types of feats that require human types of intelligence.*



# Some Definitions of AI

## 1. Building systems that think like humans

- ▶ “The exciting new effort to make computers think ... *machines with minds*, in the full and literal sense” -- Haugeland, 1985
- ▶ “The automation of activities that we associate with human thinking, ... such as decision-making, problem solving, learning, ...” -- Bellman, 1978

## 2. Building systems that act like humans

- ▶ “The art of creating machines that perform functions that require intelligence when performed by people” -- Kurzweil, 1990
- ▶ “The study of how to make computers do things at which, at the moment, people are better” -- Rich and Knight, 1991

# Some Definitions of AI

## 3. Building systems that think rationally

- ▶ “The study of mental faculties through the use of computational models”  
-- Charniak and McDermott, 1985
- ▶ “The study of the computations that make it possible to perceive, reason, and act” -- Winston, 1992

## 4. Building systems that act rationally

- ▶ “A field of study that seeks to explain and emulate intelligent behavior in terms of computational processes” -- Schalkoff, 1990
- ▶ “The branch of computer science that is concerned with the automation of intelligent behavior” -- Luger and Stubblefield, 1993

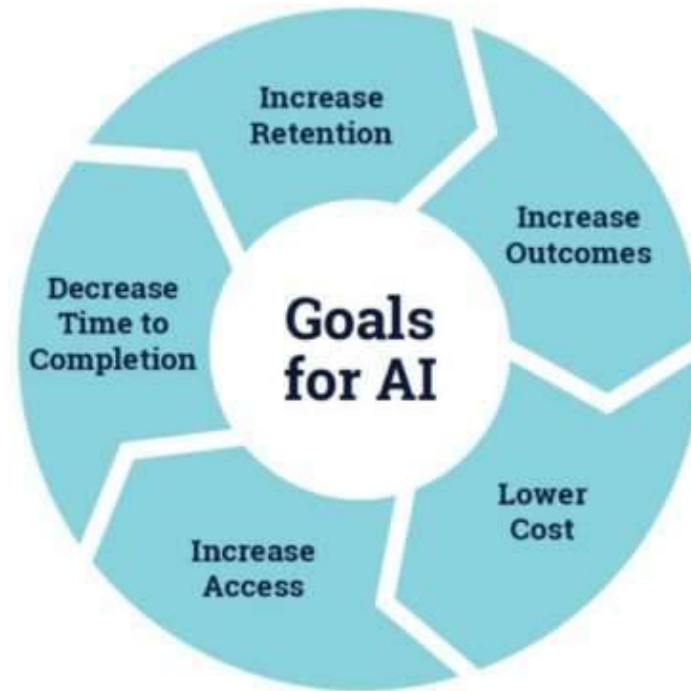
# Objectives of AI

- **The main objectives of AI research are**
  - Understand human cognition
  - Cost-effective automation
  - Cost-effective intelligent amplification
  - Superhuman intelligence
  - Coherent discourse
  - Autonomy
  - Learning
  - Store information

# Goals of Artificial Intelligence

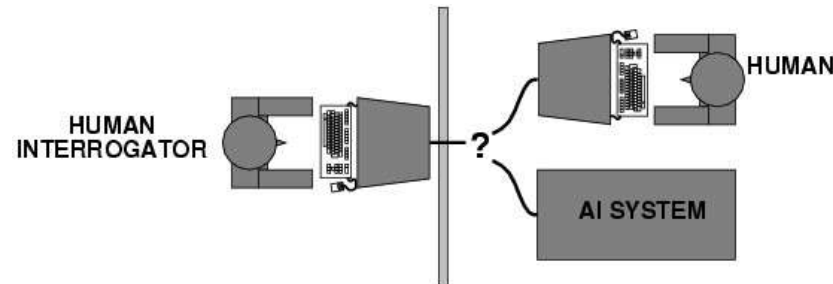
- **Scientific Goal:** to understand the principles that make intelligent behaviour possible, in natural or artificial systems.
  - ▶ analyze natural and artificial agents;
  - ▶ formulate and test hypotheses about what it takes to construct intelligent agents;
  - ▶ design, build, and experiment with computational systems that perform tasks that require intelligence.
- **Engineering Goal:** to specify methods for the design of useful, intelligent artifacts.
- Analogy between studying flying machines and thinking machines.

# AI: Goals



# Acting humanly: Turing Test

- Turing (1950) “Computing machinery and intelligence”:
- “Can machines think?” → “Can machines behave intelligently?”
- Operational test for intelligent behavior: the Imitation Game



- Predicted that by 2000, a machine might have a 30% chance of fooling a lay person for 5 minutes
- Anticipated all major arguments against AI in following 50 years
- Suggested major components of AI: knowledge, reasoning, language understanding, learning

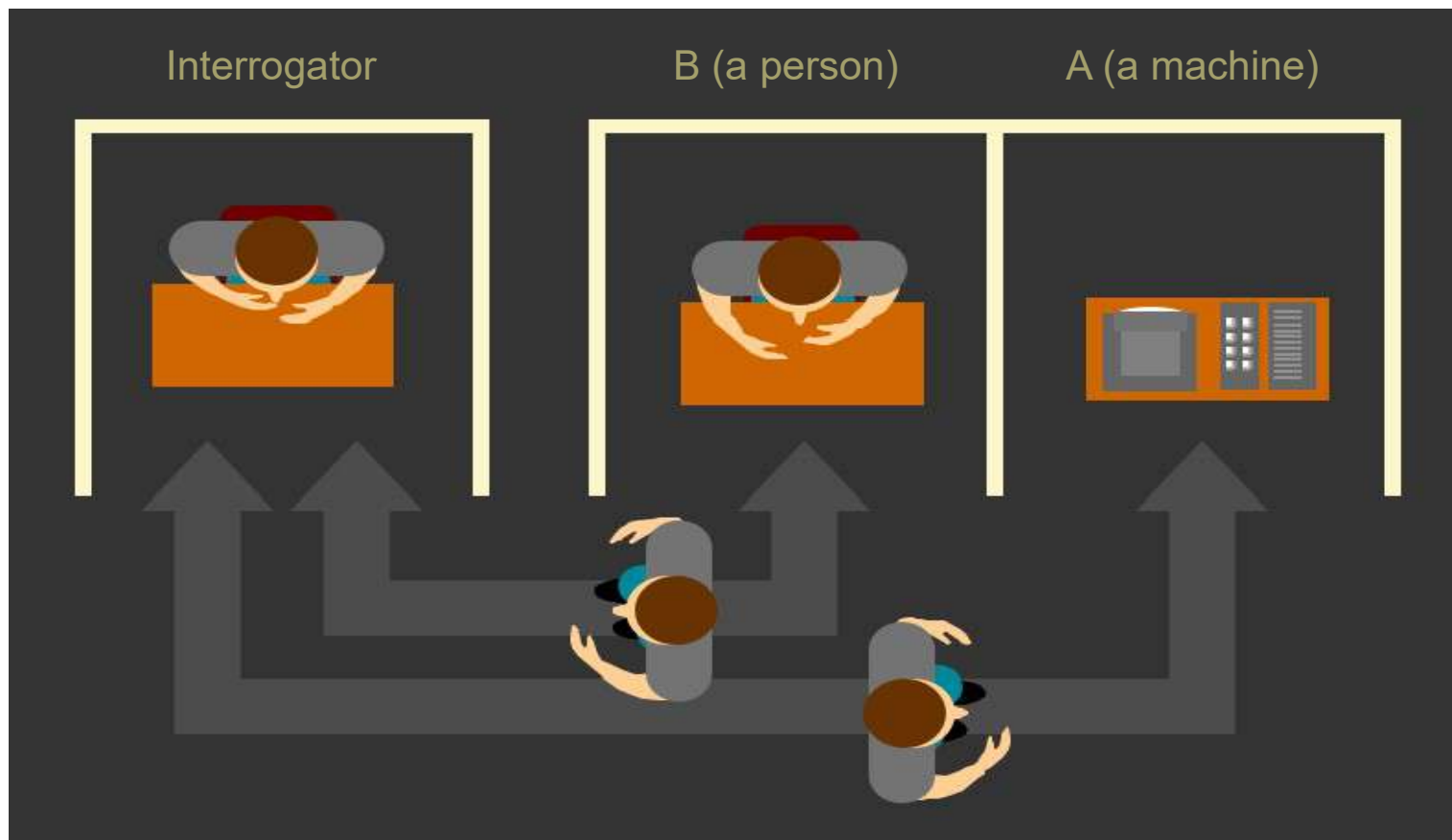
# Turing's Goal

- **Alan Turing, Computing Machinery and Intelligence, 1950:**
- Turing test: ultimate test for acting humanly
- Computer and human both interrogated by judge
- Computer passes test if judge can't tell the difference
  - ▶ Can machines think?
  - ▶ How could we tell?

“I propose to consider the question, ‘Can machines think?’ This should begin with definitions of the meaning of the terms ‘machine’ and ‘think’. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words ‘machine’ and ‘think’ are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, ‘Can machines think?’ is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.”

— Alan Turing, Computing machinery and intelligence, 1950

# Turing's "Imitation Game"





**Foundations of Artificial Intelligence**  
**TO BE CONTINUED...**